

MILLIVOLT AMPLIFIER QMVA-10/QMVA-10-1

FUNCTION

The QMVA-10 and QMVA-10-1 are solid state high-gain d-c amplifiers designed for use in analog telemetering and instrumentation systems. The amplifiers provide fixed preset voltage gains of 12 to 1500 and will accurately amplify uni-directional or bi-directional input signal levels as low as 0 to ± 5 mv. (Higher signal levels, up to 1000 mv, can also be accommodated). The two amplifiers differ only in the output voltage ranges available. The QMVA-10 output ranges are offset from zero volts, whereas the QMVA-10-1 outputs start from zero volts. A table listing the available input/output ranges is given on the following page.

The amplifiers combine all silicon semiconductors, metal oxide silicon field effect transistor (MOSFET) chopper stages, and a unique circuit design,

to achieve a high degree of sensitivity, linearity, stability and accuracy.

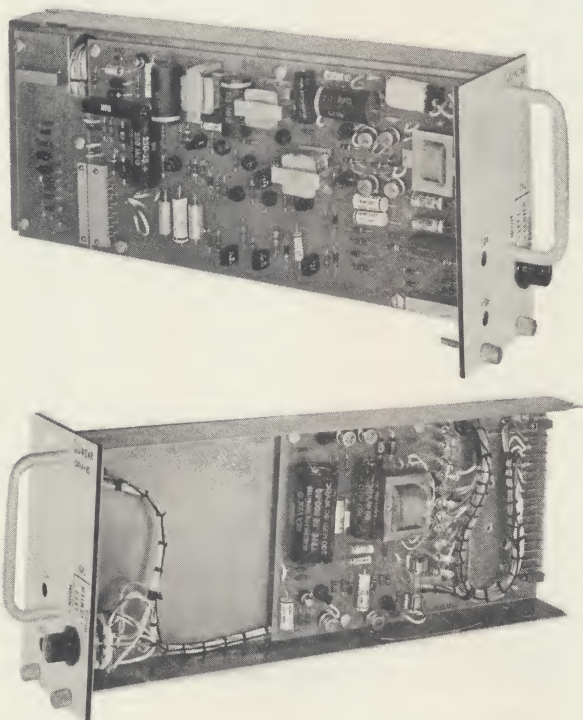
As an optional feature, the amplifiers contain an internal precision isolated voltage source which, in conjunction with a convenient front panel selector switch, enables a check of amplifier calibration at fixed left, center, and right readings on the output meter or indicator. By the addition of a tone channel, calibration can be accomplished remotely.

The QMVA-10/QMVA-10-1 series are compatible in all respects with the Quindar QATS-10 system, and the two can be used together for accurate analog telemetering of quantities derived from millivolt-level sources.

DESCRIPTION

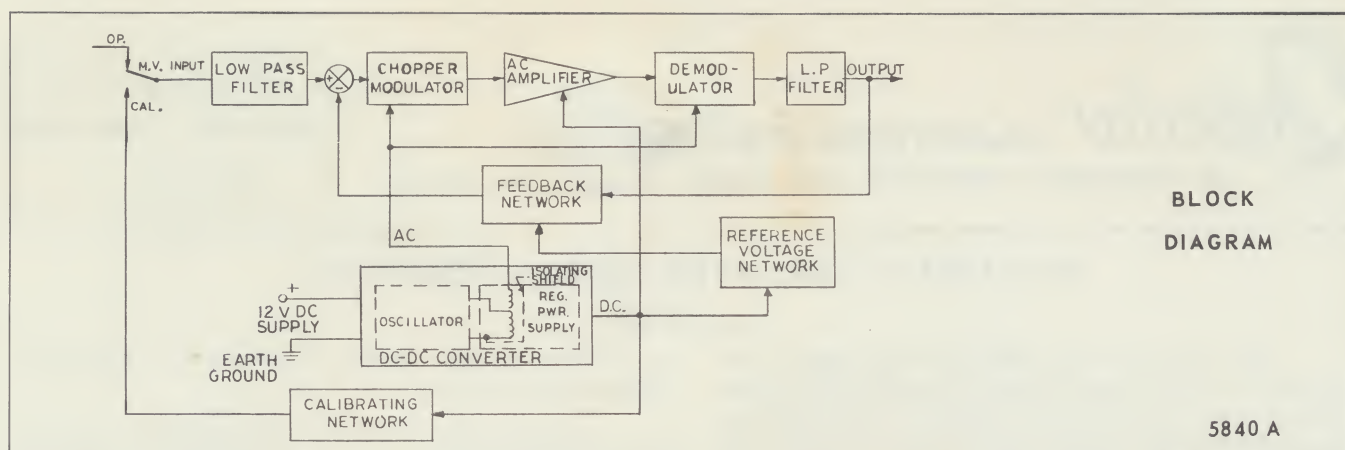
The QMVA-10 (see block diagram) consists essentially of an input low pass filter, a chopper modulator, a high gain a-c amplifier, a demodulator, and an output low-pass filter. Low-level d-c input signals are filtered to remove all frequencies above 5 cps, and are then compared to a d-c feedback voltage from the amplifier output before being applied to the chopper modulator. The chopper modulator samples the error voltage resulting from the comparison and provides a 1 KC square-wave output signal whose amplitude varies in direct proportion to the level of the error voltage. After five stages of a-c amplification, the signal is reconverted to a d-c level by a demodulator and a low-pass filter. The amplifier open loop gain of approximately 300,000 permits a large amount of negative feedback to be supplied to the input comparison junction, making the amplifier gain almost entirely a function of the feedback network characteristics. By using precision feedback elements, a high order of gain stability and accuracy is achieved.

The QMVA is powered from a self-contained dc-dc converter employing a carefully double-shielded transformer. This provides complete isolation between the signal and the power supply circuit. An additional advantage is that only a single voltage 12 volts dc supply is required in contrast to the dual 15 volt supplies usually required for amplifiers of this type. The converter also supplies the 1 KC square-wave used to drive the modulator and demodulator. For the QMVA-10, reference voltage network is included in the amplifier to produce zero offset voltages which, when applied to the amplifier feedback network, offsets the zero output point (for zero input) to either -3 VDC or -9 VDC, depending on the network used. This is done to make the amplifier output compatible (when properly scaled) with the QATS-10 input requirements.



FEATURES

- SILICON SEMICONDUCTORS USED THROUGHOUT
- MOSFET EFFECT TRANSISTOR CHOPPER STAGE
- FIXED PRESET GAINS FROM 12 TO 1500
- SIGNAL CIRCUIT ISOLATED FROM POWER SUPPLY
- INTEGRAL CALIBRATION CIRCUIT
- PROVISIONS FOR REMOTE CALIBRATION
- SELF CONTAINED REGULATED DC-TO-DC POWER CONVERTER FOR ISOLATION
- WIDE TOLERANCES ON INPUT POWER AND TEMPERATURE VARIATIONS
- 12 VDC OPERATION



STANDARD INPUT/OUTPUT RANGES	RANGE		UNIT NO.
	V in (MV)	V out (V)	
	0 to -10	-3 to -15	
	0 to -50	-3 to -15	
	0 to -100	-3 to -15	
	0 to -500	-3 to -15	
	0 to -1000	-3 to -15	
	-5, 0, +5	-15, -9, -3	
	-25, 0, +25	-15, -9, -3	
	-50, 0, +50	-15, -9, -3	
QMV A-10	-100, 0, +100	-15, -9, -3	QMV A-10-1
	-250, 0, +250	-15, -9, -3	
	-500, 0, +500	-15, -9, -3	
	0 to +10	0 to +15	
	0 to +50	0 to +15	
	0 to +100	0 to +15	
	0 to +500	0 to +15	
	0 to +1000	0 to +15	
	-10, 0, +10	-15, 0, +15	
	-50, 0, +50	-15, 0, +15	
QMV A-10-1	-100, 0, +100	-15, 0, +15	
	-500, 0, +500	-15, 0, +15	
	-1000, 0, +1000	-15, 0, +15	

SPECIFICATIONS

Gain:	Fixed gains from 12 to 1500
Gain Stability:	Better than 0.5% through specified temperature and line voltage variations.
Open Loop Gain:	300,000
Linearity:	Better than 0.5% of full scale output
Accuracy:	Maximum error of 0.5% for all ranges except below -10, 0, +10 range, which is 1.2%.
Common Mode Rejection:	120 db minimum
Input Impedance:	Greater than 1 megohm
Output Impedance:	450 ohms
Minimum DC Signal Input:	0 to ± 5 millivolts
Maximum DC Output Voltage:	± 15 VDC
Power Requirements:	11 to 13 VDC; 170 ma @ 12 VDC
Dimensions:	5-7/32" high x 3" wide x 13-3/4" deep

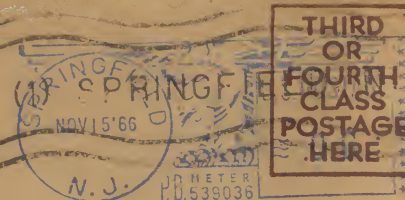
ORDERING INFORMATION

When ordering, specify QMVA-10 or QMVA-10-1 and the desired input/output range. The ranges available are listed in the standard input/output range table; other ranges are available on special order. If the calibration circuit is desired, indicate this on the order.

When the QMVA-10 and QATS-10 are used together in an analog telemetering system, refer to Bulletin 6000 for a description of the modules required to make up a QATS-10 system, and indicate those needed. Also, specify the QATS-10 output range desired.

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